

EA486F
Flight Test III
Static Margin
Homework

Given the following information about the flight test aircraft determine at least four c.g. locations by using moveable ballast (people). Insure that each of the c.g. locations is within the permissible c.g. range of the aircraft by using the c.g. envelop shown in Figure 1 and verbally described below.

Is an aircraft seating arrangement with all seats facing forward or a club seating arrangement (the middle seats facing aft) as shown in Figure 2 more advantageous?

Is it possible to run the c.g. either out the front or the back of the c.g. envelop?

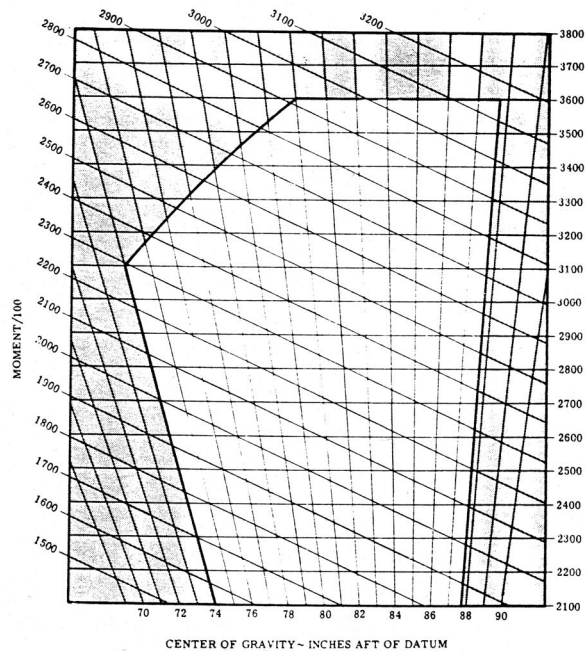
The basic empty weight of the aircraft is 2378.6 lbs.

The basic empty moment of the aircraft is 185678.74 in lbs.

Item	Arm (inches aft of datum)
Fuel	75
All seats facing forward	
Front seats	75 – 82
Middle seats	115 – 120
Aft seats	148
Club seating	
Front seats	75 – 82
Middle seats	111 – 115
Aft seats	152

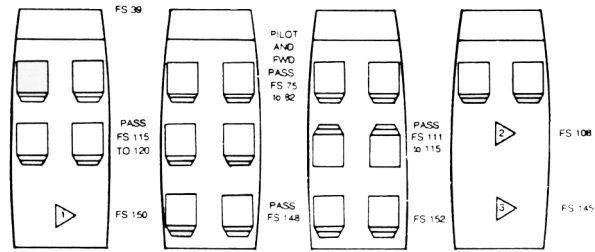
Here is a suggested calculation table

Item	Weight	Arm	Moment/100
Basic empty condition	2378.6		1856.79
Front seat occupants			
Middle seat occupants			
Rear seat occupants			
Subtotal zero fuel			
Fuel loading			
Subtotal ramp condition			
Less fuel for start & taxi			
Subtotal take-off condition			
Less fuel to destination			
Landing condition			



Envelope Based On The Following Weight And Center Of Gravity Limit Data (Landing Gear Down)

Weight Condition	Forward C. G. Limit	Aft C. G. Limit
3600 Lbs (Max. Take-Off or Landing)	81.0	87.7
3100 Lbs or Less	74.0	87.7



NOTE

The floor structure load limit is 100 pounds per square foot, except for the area between the front and rear spars, where the floor structure load limit is 50 pounds per square foot.

All baggage/cargo must be secured with an approved cargo net.

- 1 MAXIMUM WEIGHT 400 POUNDS INCLUDING EQUIPMENT AND BAGGAGE.
- 2 MAXIMUM WEIGHT 200 POUNDS FORWARD OF REAR SPAR INCLUDING EQUIPMENT AND BAGGAGE WITH CENTER SEATS REMOVED.
- 3 MAXIMUM WEIGHT 400 POUNDS AFT OF REAR SPAR INCLUDING EQUIPMENT AND BAGGAGE WITH CENTER AND AFT SEATS REMOVED.

Figure 1. Moment Limits vs weight.

Figure 2. Seating arrangements.